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Viola palmata and its allies

EZRA BRAINERD

(WITH PLATE 36)

Of the 54 species, as I understand them, of North American violets east of the 100th meridian, 28 (or over one half) are of the class familiarly known as "blue stemless violets"; and of these 28 species 13 belong to a natural group represented by the widely distributed *Viola palmata* and *V. papilionacea*. The group is well characterized by having its cleistogamous flowers on short prostrate peduncles, often concealed under dead leaves or soil; as a rule the leaves are reniform in outline, the spurred petal glabrous or nearly so, the auricles of the sepals short and appressed, and the cleistogamous capsules purplish or flecked with purple.

The group is readily subdivided into species that have lobed or parted leaves, and species that do not. The cut-leaved species, of which there are six, have been greatly confused from the time when *V. palmata* was first described and figured by Plukenet in 1692 till the present. This may be, in part, because they have their fullest development in the South, where the genus has been of late less critically studied than in the North and West. But it is also quite evident that both past and present botanists have been perplexed and misled by the frequent occurrence of aberrant forms that have arisen from the crossing of *V. palmata* and *V. triloba* with each other and with allied species.

The cut-leaved species may be separated into two radically distinct subgroups represented by *Viola palmata* and *V. triloba*, and differing as follows:

A. In the *palmata* subgroup *uncut leaves are rare, if not altogether wanting;* in the *triloba* subgroup *they are frequent*, the first one or two leaves of spring and the leaves of late summer being generally uncut. In other words, the latter subgroup is strictly *heterophyllous;* the former subgroup, *homophyllous.*

B. In the *palmata* subgroup *the leaves are palmately cut;* in the *triloba* subgroup the leaves are *pedately cut.* In all cut-leaved species of *Viola* the primary cutting is ternate, as in *Trifolium.*

If the segments were not also cut, there would be no distinction into palmate and pedate; but they usually are cut, and in two widely different ways: either (*a*) both the middle and the lateral segments are again trisected or bisected, or (*b*) the middle segment remains simple, but the lateral segments are cut one or more times, the successive incisions being shorter toward the base of the leaf. The first way gives the palmate leaf; the second the pedate leaf. Abundant illustration of this will appear, as we discuss the several species of the group.

It is noteworthy in our ten species of cut-leaved stemless violets, that those pedately cut are always heterophyllous, and those palmately cut always homophyllous. There should be some explanation of this correlation, though it is not obvious. Still, as regards the six species of the *palmata* group, may we not regard it as an evidence that the two subgroups are genetically distinct—the *triloba* species all descending from an ancestor bearing pedately cut leaves at the time of greatest sexual vigor, and the *palmata* species from an ancestor bearing at all times palmately cut leaves?

There has been some scepticism as to the correctness of the commonly accepted interpretation of the Linnaean VIOLA PALMATA. His diagnosis is certainly meager and indecisive. But he cites several earlier publications, three of which are backed up by extant specimens, and one by a published figure. The latter is in Plukenet's Amaltheum, plate 447, figure 9. The flower of the figure is not that of a violet, and is wanting in the dried specimen in herb. Sloane, London. Mr. E. G. Baker reports, in the Journal of Botany for April, 1898, that the specimen is in part distinctly pubescent, and the text of Plukenet informs us that the plant was from Florida. Now, the only cut-leaved pubescent violet found in Florida is what we have been calling *Viola palmata*.

It is quite likely that some of the specimens cited by Linnaeus, collected later in Viriginia, were forms of *V. triloba*. Clayton's *793*, in Gronovius' Flora Virginica, p. 182, 1743, is described as "foliis variis, aliis integris, aliis incisis." Linnaeus's description is, "foliis palmatis, quinquelobis dentatis indivisisque." But the two Plukenet specimens of the 17th century have no strictly uncut leaves; and in the published figure one leaf has seven lobes. Mr. Baker, as above cited, says "The plant figured by Dr. Britton as

V. palmata in his Ill. Flora [**2**: 446] well represents the species in question, except that the leaves in the types are not so much lobed,"—i. e., have fewer lobes. The Linnaean species are often composite; but even should this prove to be the case with his *V. palmata*, we have abundant warrant for restricting the name to the extant specimens cited by him,—the species earliest described, and known to botanists since the publication of the Species Plantarum as *Viola palmata*.

I recognize three forms, or geographical races, of *V. palmata* in the eastern United States:

1. The form of the coastal plains of the south Atlantic States.—I have grown now for three seasons vigorous plants of this from central Florida, kindly sent me by Mrs. Agnes Chase. I collected it near Jacksonville, in March, 1909; and near Eutaw Springs, S. C., in March, 1907. Frequent colonies were seen for a stretch of ten or twelve miles along the old turnpike from Charleston to Columbia; but here grew also colonies of *V. triloba*, and hybrids between them. However, most plants were pure and quite like those of Florida. The leaves in March are rather deeply 5–7-lobed, the outer margin distantly serrate, the lower surface often purplish; the late summer leaves—of plants grown—were 6–10 cm. wide, the basal lobes often much dilated and coarsely toothed, the lobes between the basal and the medial long and narrow.

2. The upland form along the Alleghanies from northern Georgia to western Massachusetts.—This is rarely found near the coast in the Middle Atlantic States; but occurs near the Blue Ridge in Virginia and Pennsylvania, across northern New Jersey, on shady ledges of the lower Hudson, New York, in Connecticut especially on hills of trap, and at Great Barrington, Massachusetts. The leaf of this form is often somewhat elongate, and has more numerous and shorter incisions than the southern form. It is well figured in the Illustrated Flora.

3. The form of the Great Lakes region, from the south shore of Lake Ontario to Minnesota.—This is marked by long, narrow, and still more numerous lobes, often as many as thirteen. It is referred to by Dr. Britton in the Illustrated Flora, as a "form with the lateral leaf-lobes linear, perhaps distinct." In the Britton Manual it is put forth as "*V. Bernardi* Greene" by Mr. Pollard,

misled by Professor Greene, who had confused two things under that name. In June, 1906, having "thought out" the matter, Professor Greene named the plant *V. perpensa* (Leaflets **1**: 184).

I have for three years watched these forms under cultivation, and I find no mark of specific difference in petaliferous or apetalous flowers, in pubescence, capsule, or seed. They seem to differ only in the style of lobation. In each form there is a wide range of fluctuation, the leaf assuming a different aspect, not only with change of environment, but at successsive stages of growth. The leaf-forms intergrade where the territory of one form adjoins that of another. Specimens from Syracuse, N. Y., have both styles of leaf-pattern on the same plant. I am therefore at present disposed to regard the form of the Alleghanies and that of the Great Lakes as but geographical races of the typical *V. palmata* of the south Atlantic Coast.

The species nearest akin to *Viola palmata* are *V. Stoneana** and *V. Egglestonii*,† both glabrous, both of limited range, and both well marked.

VIOLA TRILOBA was published in 1822 by Schweinitz, with some hesitancy, due chiefly to his failure to realize that he had widened the scope of Pursh's *V. asarifolia* (= *V. sororia*), so as to take into it much that properly belonged to *V. triloba*. The uncut leaves of *V. triloba* are not easily distinguished from those of *V. sororia;* and furthermore, the two plants are often cohabitant and hybridize freely. I infer that Schweinitz encountered these hybrids, for he says under *V. asarifolia*, "Not unfrequently tufts are met with of more than one foot diameter"; and also, "This species is very often found with flowers remarkably variegated, with white blotches, in an irregular way." Pied flowers and a cespitose growth are quite characteristic of hybrids. I have met with several crosses of *V. triloba* with *V. sororia* or with *V. papilionacea* in the highlands of North Carolina,‡ and with many plants that seemed the by-product of such hybrids; that is, plants with leaves all uncut, as in *V. papilionacea*, but broadly dilated, truncate rather than cordate, with densely pubescent petioles, as in *V. triloba*. These *pseudo-sororia*'s are not uncommon in the middle Atlantic states, and are a frequent source of perplexity. Their hybrid origin is usually betrayed by their infertility.

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*See Proc. Acad. Nat. Sci. Phila. **1903**: 678. *pl. 35. f. 2; pl. 39. f. 3.* 1903; Bull. Torrey Club **32**: 253. *pl. 16.* 1905.

†Bull. Torrey Club **37**: 526. *pl. 34, 35.* 1910.

‡Schweinitz lived for many years in Salem, N. C., and while there prepared his admirable paper on *Viola* in Am. Jour. Sci. **5**: 48–81. 1822.

This confusion by Schweinitz of the lines of separation between *V. sororia* and *V. triloba* was clearly shown by LeConte in his classic paper on *Viola*, published four years later. He had, I think, a correct notion of *V. triloba*, and was confident, as some moderns are not, that it differed specifically from both *V. palmata* on the one hand, and from *V. sororia* on the other. "The points of difference" he writes, "can hardly be expressed; nevertheless, I do not hesitate to pronounce it to be distinct from them all. There is something peculiar in the aspect, or if you please in the physiognomy, of each, which cannot be described, but which makes them appear distinct at first sight."*

LeConte saw fit to publish this species under a name of his own, *V. congener;* but he adds, "To this I cannot avoid referring *V. triloba* of Mr. Schweinitz; I always regret to disagree with so high an authority, but I have never been able to see between his plant and my *V. congener* any difference that was not accidental."† If so, then the name *Viola congener* must lapse in favor of the older *V. triloba*.

It has already been stated that *V. triloba* differs from *V. palmata* in having both cut and uncut leaves, and in having the cut leaves pedate instead of palmate, the latter character appearing only when the leaf is at least 5-lobed. It will then be found that the extra lobe on either side, between the basal and the medial, is morphologically a part of the basal and not of the medial. Occasionally the sinus may be deeper between the extra lobe and the basal, than between the extra lobe and the medial; but if one will trace the veins of the extra lobe downward, they will be found to coalesce with the veins of the basal lobe before they together join the midvein from the medial. Mr. Witmer Stone in his paper on the violets of Philadelphia and vicinity has figured* thirteen leaves of this species, and without intention, perhaps, has displayed their pedate character.

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*Disterminatio vix erui potest: veruntamen distinctam esse ab omnibus discernere non haesito. Aliquid peculiare in aspectu vel si vis in physiognomonia singularum est quod non describi potest, sed primo obtutu distinctas reddit. Annals Lyceum N. Y. 2: 140. D 1826.

†Huc referre Violam trilobam cel. Schweinitz vitare non queo; semper mihi dolet cum auctoritate tam veneranda dissentire, sed nunquam differentiam aliquam inter ejus plantam, et meam V. congenerem videre potui quae non fortuita fuit. LeConte, *loc. cit.* 141.

I have collected *V. triloba* as far south as Savannah, Ga., and as far north as Orwell, Vt. Between these latitudes it occurs from the coast westward across the Appalachian Mountains, though not at high altitudes northward.

The radical difference between *Viola triloba* and *V. palmata* will appear more pronounced after we have discussed another long misunderstood type of our early botanists, the *V. palmata*, var. DILATATA of Elliott. It has appeared in recent articles and text-books as equivalent to *V. triloba;* but an attentive reading of Elliott's description ought to convince an experienced botanist to the contrary, for Elliott's plant has deeply parted leaves. He reports it as common in the uplands of Georgia and Carolina; surely it ought to be identified. After visiting this region in April for three successive years, I am satisfied that it is the same thing that Professor Greene published, in January, 1899, as *V. falcata*. (Pittonia **4**: 3.)

First let us place side by side the descriptions of these two types. Some of the clauses from Elliott are rearranged to bring out the parallelism, but no word is altered or omitted; the clauses from Greene covering the same points are given in the finer type beneath.

ELLIOTT: c. *dilatata:* with leaves deeply three parted,
GREENE: blades of broad deltoid outline primarily deeply cleft or even divided into 3 segments,

the middle segment large, toothed;
of which the middle one is usually simple lanceolate or rhombic-lanceolate, } remotely toothed above the middle or even throughout.

the lateral segments 2 cleft,
the lateral divisions mostly cut into two or more lobes or subdivisions,

the exterior division dilated and toothed, sometimes dissected;
of which the outer are more or less notably lunate or falcate.

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*Proc. Acad. Nat. Sci. Phila. **1903**: *pl. 33*.

the whole plant very pubescent.
sparsely pubescent, the long petioles retrorsely hirsutulous.

It might be difficult to say which is more admirable, the clear conciseness of Elliott, or the detailed exactness of Greene; but surely all must concede that both these expert phytographers are describing the same thing—a pubescent violet with pedately dissected leaf. The apparent discrepancy between "very pubescent" and "sparsely pubescent" is due to the fact that Professor Greene's specimens were collected in southern Illinois, June 15, about two months after petaliferous flowering. When the plant blooms, in the South about the first of April, the unfolding leaves are markedly pubescent; two months later when they have attained their normal size the pubescence, spread out over a surface perhaps thirty times as great, seems sparse. Moreover, as with most pubescent violets, the leaves *produced* in midsummer are nearly glabrous. Such foliage is commonly described by the ambiguous word "glabrate."

Now to which of the older species has this var. *dilatata* of Elliott the closest kinship? Surely not to *Viola palmata* as he supposed; *that* has leaves palmately cut and seeds always dark brown; Elliott's plant has only some leaves cut and that pedately, and seeds always a light buff. But in these characters it agrees with *V. triloba*, as it does also in flowers, capsule, and pubescence. The only difference that I can make out is that in var. *dilatata* the cut leaves have more and deeper incisions. Moreover, in the southern Alleghanies where both forms occur, they are connected by numerous intergradations. I am therefore compelled to call the plant:

Viola triloba Schwein., var. **dilatata** (Ell.), comb. nov. *V. palmata* L., var. *dilatata* Ell.; *V. falcata* Greene.—Dry woodlands and thickets; abundant from southwestern Louisiana northward to northern Oklahoma, southern Missouri, and southern Illinois; thence eastward to northern Georgia and western North Carolina (PLATE 36).

Flowering specimens of this attractive violet are rarely seen even in university herbaria. It was distributed in Greene and Pollard's decades—no. 2, collected at Biltmore, N. C., June 3–17, 1899, long out of bloom. Other collections are: *Eggleston 4506*, Kuttawa, western Ky., June 2–18, 1909; *Bush 2313*, Fulton, Ark., April 13, 1905; *Bush 2942*, Swan, Mo., May 21, 1905; *Bush 4435*, Chadwick, Mo., May 14, 1907—all in fruit. Specimens in flower are: *Bush 4208*, Swan, Mo., April 21, 1907; and *Bush 4340-A*, Monteer, Mo., April 27, 1907. Specimens collected last March and April in Crowley, La. (within 45 miles of the Gulf), at Mansfield, La., at Mena, Ark., and at Westville, Okla., appear in my distribution, 1910, of violets of eastern North America.

A few words should be said of another little-known violet of Elliott's, V. ESCULENTA. It appears in Small's Flora of the Southeastern United States as *V. heterophylla* Muhl. The type is to be seen in the Elliott herbarium, now carefully preserved in the Charleston Museum. The plant has unusually long petioles and peduncles—most over 25 cm.—apparently "drawn" from the crowding of other plants. It has one uncut leaf on a petiole of 10 cm., one cordate-ovate leaf with short hastate lobes, and two broadly reniform leaves deeply 5-lobed. Raised above the leaves is a half-grown capsule split in drying, and three cm. lower, a petaliferous flower. The ticket has the following inscription:

Viola esculenta
mihi:
Heterophylla
Muhl:
Flor. Apr:
in udis, Ogeechee etiam in
river swamps. Pennsyl:

When, however, in 1817 Elliott published this violet in his Botany of South Carolina and Georgia, it was under the name *V. palmata* L., var. *heterophylla*, with the remark, "From the circumstance of its being eaten by negroes, I had called it *V. esculenta;* it is however the *V. heterophylla* of Muhlenberg." A valid publication of this last specific name was made by LeConte in 1826. He observes that the plant bears hardly any affinity to *V. palmata*, and adds, "It is strange that Elliott, otherwise sufficiently disposed to multiply species, was content to regard this as a variety."* Doubtless both were in error in regarding Muhlenberg's northern plant as identical with the glabrous species of southern river-swamps. *V. heterophylla* stands merely as a name in Muhlenberg's catalogue of 1813; but his plant was probably *V. triloba*, a very common violet of eastern Pennsylvania. Fortunately, the *V. heterophylla* published by LeConte is invalidated by two earlier uses of the name, and effective publication of *V. esculenta* was made by Professor Greene in 1898 (Pittonia 3: 314).

Viola esculenta is very abundant in the suburbs of Jacksonville, Florida, in low woodlands on the borders of sluggish brooks, or "branches." In the older plants the rootstock has a crimson color and branches widely; the leaves, at least in cultivation, are spreading and become stiff and succulent; the flower is pale violet or white; the seeds normally light buff, though in some colonies they are a dark brown. The plant, which I have grown for two seasons and also raised from seed, strikingly illustrates the habit of the heterophyllous violets in putting forth characteristic lobed leaves only at the time of petaliferous flowering and fruiting. Not only are the late summer leaves uncut or obscurely lobed, but the seedling plants are so through the whole of the first season's growth. It is especially true of *V. esculenta* that cut leaves mark the period of the plant's greatest reproductive vigor. As LeConte says with a touch of poetry, "when flowering it takes delight in lobed leaves."† The foliage is usually quite glabrous; but in one colony I found it somewhat pubescent. I suspect this pubescence and the dark brown seeds may have come about through intimacy with a nearby colony of *V. palmata*. But in the several plants tested, I found that both these off characters, though 'dominant,' came true from seed.

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*"Mirum est Elliottum alioquin satis proclivem ad multiplicandum species hanc pro varietate habere contentum fuisse."—Elliott lumped together *all* the cut-leaved stemless violets of his region under *V. palmata* and its varieties. Besides the two discussed above, *V. triloba* is covered by his description of *V. palmata*, and his var. *vulgaris*, of which he says "The two exterior lobes of the leaves have frequently a small segment near the base; grows very common in light soil," is plainly what LeConte published later as *V. septemloba*. Dr. Gray, also, aggregated these forms in the Synoptical Flora, allowing none even varietal rank.

†Cum primum e terra prodit, foliis integris, inflorescens lobatis gaudet, dein cum flores apetalos profert, folia iterum integra habet. LeConte, *loc. cit.* 139.

The seven species of the *palmata* group that have only uncut leaves call for no special discussion in the present paper, as most of them have been considered elsewhere.* But I wish to record an interesting extension of range for *Viola latiuscula*. Mr. B. H. Slavin, of the Park Department of the city of Rochester, has found the species widely distributed in western New York; it has turned up not only at several stations in the vicinity of Rochester, but in three other counties—at Portage, Falconer, and Olean, and even across the state line at Bradford, Pennsylvania.

The general conclusions of the present discussion may be presented in the following

Synopsis of Viola palmata and allied species

Leaves all palmately 5–11-lobed or -parted, or rarely the first leaf of spring uncut.	
Plants villous-pubescent, seeds brown.	*V. palmata.*
Plants nearly or quite glabrous.	
Leaf segments closely crenate-serrate, seeds brown.	*V. Egglestonii.*
Leaf segments remotely crenate-serrate, seeds buff.	*V. Stoneana.*
Earliest and latest leaves usually uncut, others pedately 3–7-lobed, -parted, or -divided, seeds generally buff.	
Plants villous-pubescent.	
Cut leaves mostly 3-lobed, with broadly open sinus.	*V. triloba.*
Cut leaves mostly 5–7-parted, with narrow sinus.	*V. triloba*, var. *dilatata.*
Plants obscurely pubescent and glabrate, flowers deep violet; of shady uplands.	*V. Lovelliana.*
Plants glabrous, flowers pale violet; of wet woods.	*V. esculenta.*
Leaves all uncut.	
Plants nearly or quite glabrous.	
Flowers violet-purple, seeds brown.	
Petioles smooth; plants of moist soil.	*V. papilionacea.*
Petioles glandular-roughened; plants of dry soil.	*V. latiuscula.*
Flowers rose-purple, seeds buff.	*V. rosacea.*
Flowers pale violet or white, seeds buff.	
Vernal leaves narrow, gradually attenuate.	*V. missouriensis.*
Vernal leaves broad, subcordate.	*V. floridana.*
Plants villous-pubescent, especially on petiole and lower leaf-surface, seeds dark brown.	*V. sororia.*
Plants hirsutulous on upper leaf-surface, elsewhere glabrous, seeds buff.	*V. hirsutula.*

MIDDLEBURY, VERMONT.

Explanation of plate 36. All × ⅔.

A. *Viola triloba* Schwein., var. *dilatata* (Ell.) Brainerd. Mansfield, La., March 28, 1910. B. Single pedately divided leaf, from *Eggleston 4506*, Kuttawa, Ky., June 3–17, 1899. C. Ripe capsules from cleistogamous flowers, ex horto, Middlebury, Vt., transplanted from Mansfield, La., March, 1910.

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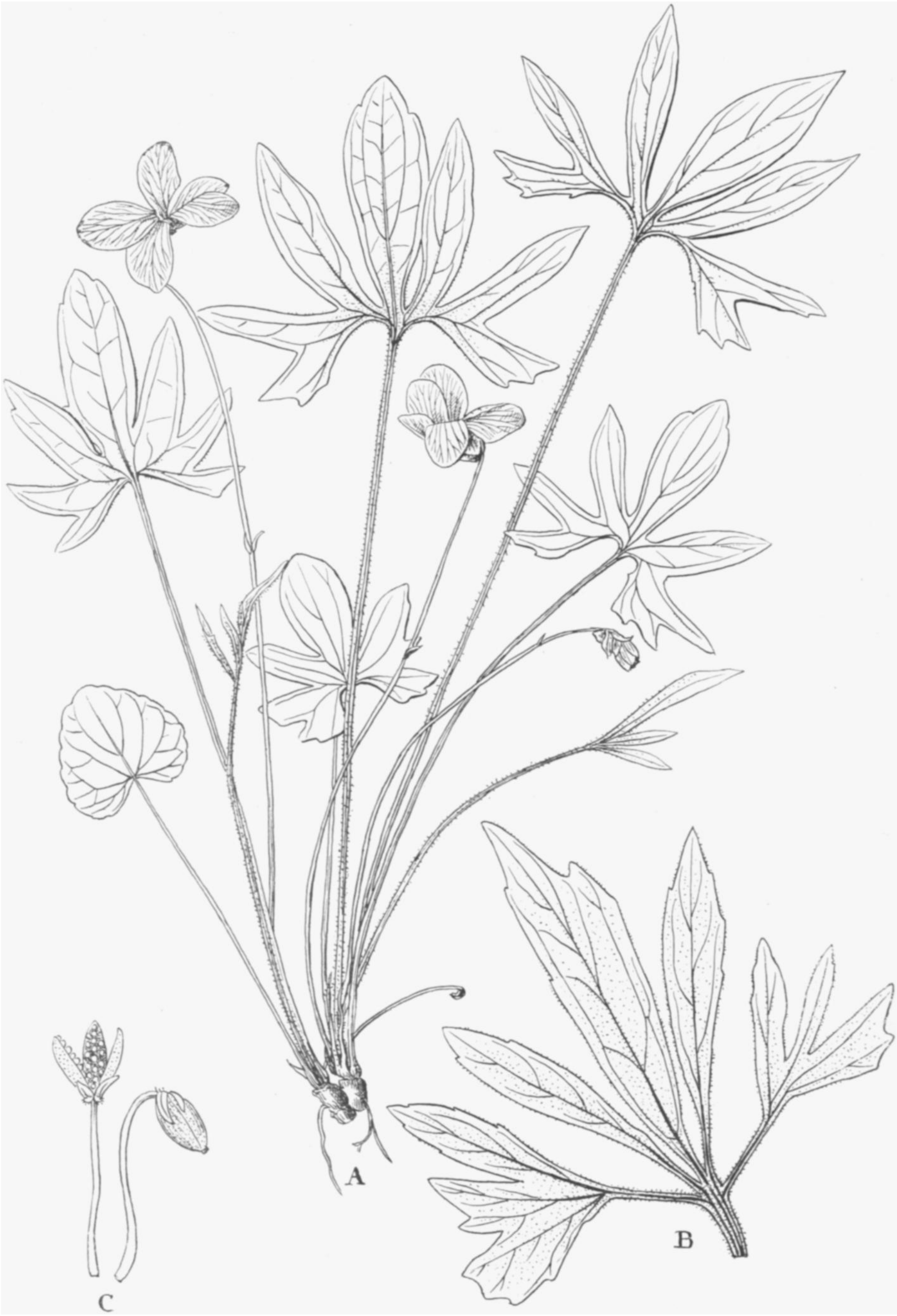
*See Rhodora **9**: 93–98. 1907; also Bull. Torrey Club **37**: 524, 525. 1910.



VIOLA TRILOBA Schwein., var. DILATATA (Ell.) Brainerd